CLAIMS

What is claimed is:

1. A method comprising:

depositing a zeolite - solvent solution on an underlying layer;

removing at least some of the solvent from the zeolite – solvent solution to form a zeolite film; and

depositing a carbon doped oxide (CDO) in the zeolite film to form a zeolite – CDO composite film.

2. The method of claim 1, wherein the solvent is water.

3. The method of claim 1, wherein the solvent is an organic oligomer.

4. The method of claim 3, wherein the organic oligomer is selected from a group consisting of polyethylene glycol, poly styrene, poly (Methacrylates), Poly (acrylate), or poly ethylene oxide.

5. The method of claim 1, wherein removing at least some of the solvent from the zeolite – solvent solution comprises:

drying the zeolite – solvent solution.

6. The method of claim 1, wherein removing at least some of the solvent from the zeolite – solvent solution comprises:

vacuuming the zeolite – solvent solution.

7. The method of claim 1, wherein depositing the zeolite - solvent solution on the underlying layer comprises:

spin-coating the zeolite - solvent solution on the underlying layer.

8. The method of claim 1, wherein depositing the zeolite - solvent solution on the underlying layer comprises:

dip-coating the zeolite - solvent solution on the underlying layer.

9. The method of claim 1, wherein depositing the CDO in the zeolite film comprises:

chemical vapor deposition of the CDO in the zeolite film.

10. The method of claim 1, wherein the CDO is a silicon oxide.

11. The method claim 1, wherein the underlying layer is a wafer.

12. The method claim 1, wherein the underlying layer is an interlayer dielectric layer.

13. The method claim 12, wherein the interlayer dielectric layer comprises a zeolite – carbon doped oxide composite film.

14. The method of claim 1, further comprising calcinating the zeolite – CDO composite film to form a solid phase zeolite – CDO composite film.

15. The method claim 14, wherein calcinating the zeolite – CDO composite film comprises:

heating the zeolite – CDO composite film; and

cooling zeolite – CDO composite film.

16. The method of claim 15, wherein heating the zeolite – CDO composite film is done in an oven.

17. The method of claim 16, wherein the oven is at a temperature in the range of 300°C to 550°C.

18. The method of claim 14, wherein the steps of depositing the zeolite - solvent solution, removing at least some of the solvent from the zeolite – solvent solution, and depositing a CDO are repeated before

calcinating the zeolite – CDO composite film to achieve a thicker zeolite – CDO composite film.

19. A method comprising:

forming a zeolite – carbon doped oxide (CDO) composite interlayer dielectric on an underlying layer;

etching a via opening and a trench in the zeolite – CDO composite interlayer dielectric; and

forming a conductive material in the via opening and the trench.

20. The method of claim 19, wherein forming the zeolite – CDO composite interlayer dielectric on the underlying layer comprises:

depositing a zeolite – solvent solution on the underlying layer;

drying the zeolite – solvent solution to remove at least some of the solvent to form a zeolite film; and

depositing a CDO in the zeolite film by chemical vapor deposition to form a zeolite – CDO composite film;

heating the zeolite – CDO composite film; and

cooling the zeolite – CDO composite film.

21. The method of claim 20, wherein depositing the zeolite – solvent solution on the underlying layer comprises spin-coating the zeolite – solvent solution on the underlying layer.

22. The method of claim 20, wherein depositing the zeolite – solvent solution on the underlying layer comprises dip-coating the zeolite – solvent solution on the underlying layer.

23. The method of claim 20, wherein the CDO is a silicon oxide.

24. The method claim 20, wherein the underlying layer is a wafer.

25. An interconnect structure comprising:

at least a via and a trench defined by a carbon doped oxide (CDO) – zeolite composite dielectric, which is disposed above an underlying layer;

a barrier layer disposed on the surfaces of the carbon doped oxide (CDO) – zeolite composite dielectric; and

conductive material disposed in the via opening and the trench.

26. The interconnect structure of claim 25, wherein the CDO is a silicon oxide.

27. The interconnect structure of claim 25, wherein the barrier layer comprises tantalum.

28. The interconnect structure of claim 25, wherein the conductive material comprises a copper alloy.

29. The interconnect structure of claim 25, wherein the underlying layer is a wafer.